154 SEAWALLS, BULKHEADS, QUAYWALLS

Seawalls, bulkheads, and quaywalls are shore protective structures not intended primarily for berthing vessels. Bulkheads and quaywalls have the principal advantage of affording accessibility for their entire length along the foreshore. In addition, a much greater working area normally is available at each berth for storage, laydown, and repair operations than at berths alongside piers and wharves. The ratio of berthing space to a given length of waterfront, however, is much less for bulkheads and quaywalls. The relative cost per berth is much greater for quaywalls, especially for those in deep water or at sites with poor foundation conditions. Maneuverability into a berth at a long quaywall occupied by ships in adjoining berths is more difficult than entry into a single-length pier berth. In spite of these drawbacks, a quaywall may prove to be the only choice at a site located along a river or other relatively narrow channels if the natural terrain is high along the shore, making dredging of a recessed basin for piers very expensive, or if there is insufficient width of waterway for safe navigation into finger piers projecting out at an angle from the natural shoreline.

154 10 BULKHEADS (LF)

A bulkhead is a flexible wall partition that retains earth along a shoreline. There are two general types. The most common type, which has no relieving platform, is used in relatively shallow water; the type with a relieving platform is used in relatively deep water. In addition to their function as protective boundary structures for filled areas, bulkheads are used as seawalls or as berthing facilities for the smaller classes of naval vessels. Barges, tugs, and other small yardcraft are berthed at bulkheads at the in-shore ends of slips between piers. Heavy-supply operations and ship repairs usually are not possible on bulkheads. The maximum water depth that can be provided in front of a simple bulkhead is limited to about 30 feet. The maximum water depths for bulkheads without relieving platforms is 16 to 30 feet, while the maximum depths for bulkheads with relieving platforms is 20 to 35 feet. See Definitive Designs, NAVFAC P-272. The linear footage and type of bulkheads required at any one installation would be determined by site location, topography, wind and wave action, and by the numbers and types of yardcraft for berthing.

154 20 QUAYWALLS (LF)

A quaywall is a heavy gravity or platform structure fronting on navigable water and behind which earthfill is placed to finish grade along its length. There are two general types: the open-type quaywall and the closed-type quaywall. Numerous variations exist in the design and construction of each of these two general types.

At sites having deep water or poor soil condition, quaywalls are used instead of bulkheads as retaining structures at the inshore ends of slips between piers. A quaywall will provide berthing for vessels of greater draft than can be accommodated at a bulkhead. Service classification of quaywalls, such as active berthing, repair, supply, and fitting-out are

identical with those used for piers and wharves. Quaywalls are not employed for fueling or ammunition handling operations. Open-type quaywalls have bulkheads located on the inshore face, so that piles beneath the platform structure stand in open water. Use of the open-type quaywall normally is not economical in depths greater than 40 feet. See Definitive Designs, NAVFAC P-272.

A closed-type quaywall is one in which the earthfill extends to the entire height of the wall along the harbor face. A great advantage common to all closed-type quaywalls is the flexibility and installation and relocation of tracks and services within the earthfill.

The linear footage and type of quaywalls required at any one installation would be determined by site location, topography, wind and water action, and the numbers and types of vessels for berthing.

154 30 SEAWALLS (LF)

A seawall is a structure that is built along and parallel to a shoreline for the purpose of protecting and stabilizing the shore against erosion resulting from wave action.

Seawalls are classified according to the profile of the exposed wallface and may be vertical wall, curved face, stepped face, or composite. See Definitive Designs, NAVFAC P-272.

The most economical and efficient seawall for a particular location can be determined only after a thorough study of local hydrography and meteorology 9 the amount and type of protection desired, and the character of the property to be protected. For a seawall project of sufficient magnitude, a model test is the most reliable and expeditious means of determining the effectiveness of the proposed design under the exposure conditions previously determined to exist in the area. The availability of labor and materials will have a great influence on the type of structure chosen and the materials used in its construction.